

ART. II.—*Report by Lieut. JOHN GLASFURD, Executive Engineer Kumaon division, on the progress made up to the 1st May, 1839, in opening the experimental Copper Mine in Kumaon.*

The ground selected for the experiment is at Pokri in the Pergunnah of Nagpoor in Gurhwal, where mines of Copper have long been worked.

The mines, or rather excavations, are numerous, and are situated on the western side of a steep hill in talcose schist and clay slate. The soil is extremely soft and decayed, and has defied all the efforts of the present race of native miners, according to whose accounts the workings do not extend beyond 120 feet from the entrance in any of the excavations, which are constantly liable to accidents, and of which a new one is generally commenced after every rainy season. It is however universally admitted that the Pokri mines have been very productive, and it is said that the one known by the name of the Rajah Kān, yielded one year upwards of 50,000 rupees. Judging from the ruins of the houses, workshops, &c., and the accumulation of slag, the working must have been carried on, on an extensive scale.

The village of Pokri is situated about 6,100 feet above the level of the sea, and 3,800 above the Alukmenda river, from which it is distant nearly nine miles; the distance from Almora is eighty-six, and from Sreenuggur little more than thirty miles, and to both of these places there are good roads. The climate is good but changeable, owing to the vicinity of the Snowy range; and the temperature is from the same cause as cold as that generally found at elevations from 7,000 to 7,500 feet. The vegetation, as might be expected, is European in its character, and the forests of oak, rhododendron, and the common long-leaved pine are almost inexhaustible in the immediate neighbourhood of the mines. During the greater part of the year there is water sufficient for washing the ores in the immediate vicinity, and at a distance of about two miles, there is enough for the purposes of machinery throughout the year. The village consists of eighteen to twenty-two houses, and from sixty to eighty inhabitants, who are chiefly of the Chowdry and Mining castes. The right of mining was rented by them from Government on a quinquennial lease of 100 rupees per annum, which expired about a year ago; but the people are so poor, and their resources so limited, that they have been unable to undertake any new lease, and indeed before the present experiment was commenced they hardly attempted more than the re-smelting portions of the slag from the old working.

The mining ground lies in two ravines, both on the western face of the hill, and about 500 yards apart, separated by a low ridge, the direction of the ravines being nearly east and west. The most northern of the two, and in which the village is situated, is where the old mine called the Rajah Kān was. The right, or northern side of the ravine is of dolomite, the left being talcose schist, which forms the ridge separating the two. The southern ravine is known by the name of Chumittee, and is full of old excavations; the formation is talc, bounded on the south by a dolomite limestone, and on the north by the low ridge of talcose schist through which in one or two places granite protrudes. Besides these, there are several other localities on the same hill where copper has been extracted; one very promising situation is an old mine known by the name of the Dandu Kān, or hill mine, about four miles from Pokri, and there are also many other places in the Pergunnah of Nagpoor, where copper is known to exist.

The experimental works now in progress were commenced in January last, and consist of two adits, or galleries, one in each ravine; that in the northern, or Rajah Kān ravine, has been driven and secured with timber to a distance of $149\frac{1}{2}$ feet from the entrance; the gallery is six feet high by three feet wide, and the frames, which are oak branches of three and a half to four inches diameter, are placed from two to two and a half feet asunder; the top and side sheeting are also of oak branches, the diameter of which is about two and a half inches. The gallery is being carried in with a slope of one inch per foot nearly on the ruins of an old working, which has been roughly secured with timber, but has long fallen in. The soil is an alluvial deposit filled with masses of rock, chiefly of dolomite, and the water proceeding from the gallery is slightly impregnated with sulphate of copper. When about sixty-three feet from the entrance the superincumbent soil gave way, and fell in on the head of the gallery; this breach has been cleared and converted into a rough shaft, which at present answers for the purpose of ventilation, but as it is directly in the line down which the water runs in the rainy season, it will probably be necessary to close it.

In the Chumittee ravine a gallery has been driven and secured with timber to a distance of 111 feet from the entrance; it is in size and mode of timbering exactly similar to the other, the slope averaging only half an inch per foot. The first seventy-five feet were driven through talc slate, with occasional beds of quartz, in which were small quantities of copper pyrites; the next six feet passed through an old working which apparently went down obliquely, and had been regularly timbered with deal; on reaching this working, traces of copper were found, but were lost on entering it. The next twenty-four feet went

through firm talc slate in which copper ores, in trickling strings, and also disseminated, were found. The ores were of various kinds, but vitreous copper ore predominated. From these twenty-four feet fifty-eight or sixty seers of rich ores, worth about twenty per cent. of copper were obtained, one-half of which reverted to the miners, according to previous agreement, also a quantity of stuff supposed to contain about forty maunds, which would probably produce twelve to fifteen per cent. of copper. The last six feet of the gallery passed through another old working exactly similar to the former, and which also appears to have gone down obliquely. A perpendicular shaft has been commenced 150 feet from the entrance of the gallery, for the purpose of ventilation; it has been sunk to a depth of thirty feet, and it is expected that by the time this shaft has attained the requisite depth, the gallery will have advanced far enough to join it. The dimensions of shaft are 6×3, the frames are of oak, and the sheeting fir; the first three feet were through alluvial deposit, the next ten through talc slate, and the next five through what appears to have been an horizontal adit filled with deal timber and blue talcose mud, ten pounds of which on being washed, left four ounces of ore, worth probably ten per cent. The remaining twelve feet went through alternate talc and dolomite, or rather having talc on the north side and dolomite on the south. The water oozing from the old working has much impeded the shaft, the quantity discharged by wooden buckets averaging daily about 500 gallons.

The supply of iron required for the works is obtained from the mines of that metal in the Khutsaree valley, about forty miles from Pokri, on the road to Almora. In this valley there are large repositories of compact red iron ore in clay slate, containing beds of limestone. The manufacture of iron is carried on here more extensively than at any other place in the province, and the metal produced is considered superior to any other here manufactured. There is no want of iron ore in the district, and it exists in many places nearer to the Pokri mine than Khutsaree. At Dewalgurh, half way between Pokri and Sreenuggur, good iron is worked, and about two miles south of the village of Pokri there is an old deserted mine, the specimens from which are specular iron ore, which might probably be worked with advantage.

The present race of native miners have been at Pokri for three generations, and have no recollection or tradition of fir timber having been used in the mines; and until it was found on the old workings, they strongly protested against the use of it. The timber found in the Chumittee gallery appears to have been put together with considerable

care, and where firmly bedded in the mud is perfectly sound, but where at all exposed it is much decayed.

The natives of the place are well satisfied with the experiment as far as it has gone, and the applications for employment are more than required; they are also very willing to adopt any improvement on their own rude system, and readily falling into and becoming expert in the use of the tools, &c. The work in the galleries has been performed partly by contract and partly by hired labour; in the former mode the rate paid is about one rupee per foot with half the ores found, and in the latter two annas per day. In the Chumittee gallery the people prefer contracting, in the hope of obtaining profit from the ores found; whereas in the Rajah Kān gallery, as no copper can be expected while passing through the alluvial deposit, they are not at present willing to contract.

The result of the experiment so far may be considered satisfactory, and it is quite certain that copper in considerable abundance has existed in the ground through which we are now passing in the Chumittee ravine, assuming that this ground has been more or less disturbed to a depth of 120 feet—the greatest the native miners say has ever been attained by them, although I question if ever they got so far. We may reasonably hope that by the time the gallery has reached to a distance of about 280 feet we will enter upon ground hitherto untouched, and until this is reached no fair criterion of its capabilities can be formed. I do not expect to make much progress during the rains, owing to the very loose nature of the soil; wherever we have passed through old workings considerable delay has been experienced from the constant falling in of the soil.

(True Copy,)

H. T. PRINSEP,

4th July, 1839.

Secy. to the Govt. of India.

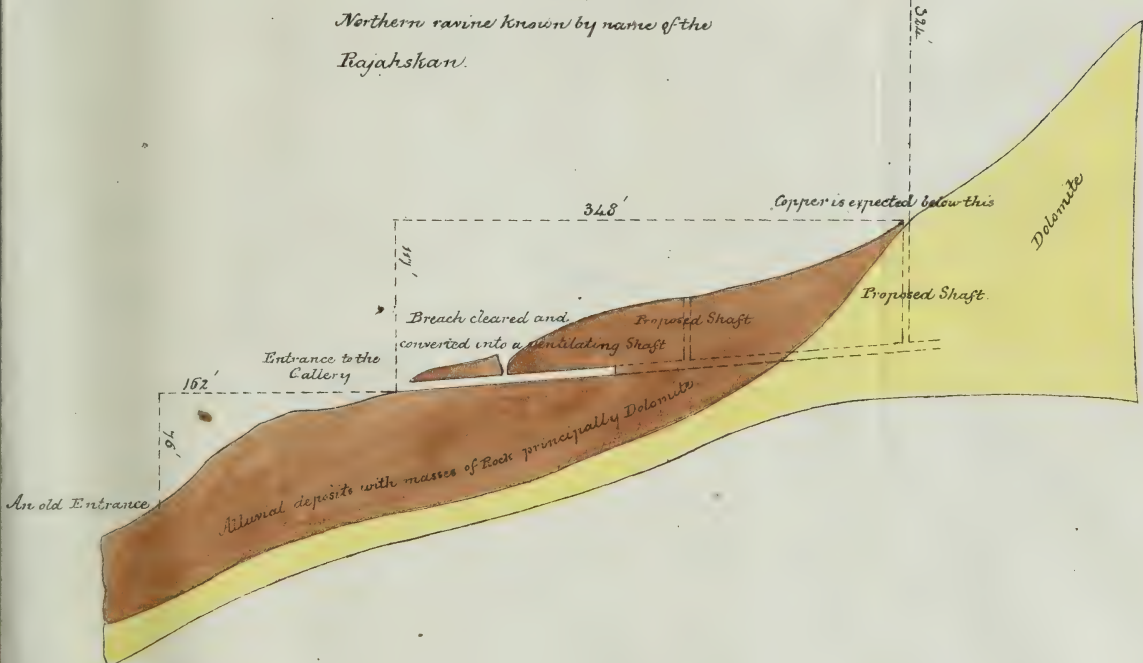
ART. III.—*Account of a Journey from Sumbulpūr to Mednīpūr, through the Forests of Orissa.* By LIEUT. M. KITTOE.

(Continued from page 383.)

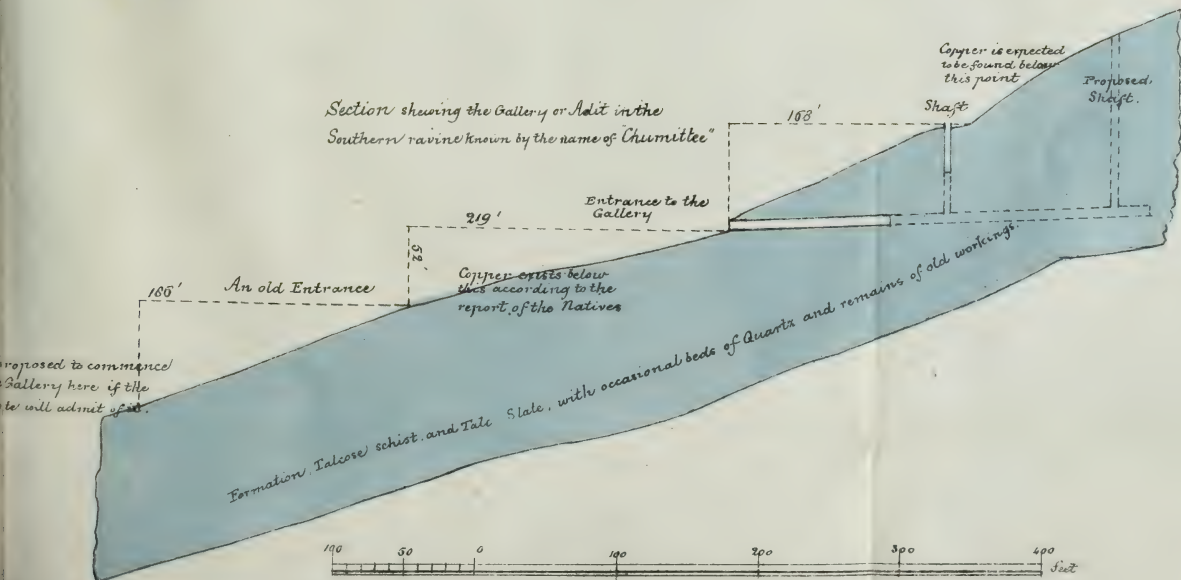
I resumed my march towards Mednīpūr at 3 A. M. the following day, and reached Deogurh, the capital of the Baumurra district, at 8 o'clock; on leaving, it was too dark to see any distance, this was of no consequence, as there were high hills close on either side. I had to descend a slight ghāt, at the foot of which I crossed the Burghat torrent; were the dawk road to pass this way it would be necessary to have a suspension bridge over it, likewise on most of these hill torrents. For the first

At 76 from this there is an old entrance!

Section shewing the Gallery or Adit in the Northern ravine known by name of the Rajahskan.



Section shewing the Gallery or Adit in the Southern ravine known by the name of "Chumitlee"



Almorah }
3rd July 1839

For Journal of the Asiatic Soc^y

John Glasford Ince

Asiatic Soc^y Libr. Prof. Col.

Ex. Eng^r Kumaon D^{no}



six miles the path is very circuitous, winding round the bases of several hills, there are many water courses, and the number of loose stones of all sizes strewed about, render it very painful to travel over. The Saul forest is very dense, and there are some very fine timbers, it continues so for five and a half miles. Our course thus far had upon the whole been north-easterly, we here turned to the southward, in which direction we continued for a short distance, and crossed a shallow running stream called Jurrítóora, flowing to the right; we then came upon an open spot in the centre of a beautiful plain, with fine mango topes around it; this is a Bunjara halting place; there was formerly a small hamlet close by, but during the disturbances between the Raja and the Sumbulpúr people, some years ago, it was destroyed. Half a mile further forward the same rivulet is recrossed, the road then turns to the eastward, and together with the stream passes through an exceedingly narrow defile, called Juraikilla, into the valley of Deogurh; the hills are exceedingly high on either side, those to the left (or north) have faces nearly perpendicular. There are the remains of a stone wall and of a stockade, by means of which the Deogurh people are said to have often successfully defended themselves against their invading enemies.

On passing the defile the valley appears in all its beauty, extending west to east as far as the eye can reach, widening with a perceptible fall in that direction which is towards the valley of the Brahmení river, into which the Jurrítóora rivulet empties itself, after winding along the valley at the foot of the hills skirting its southern boundary. The view from the pass, looking east, is exceedingly beautiful, indeed nothing could be more grand. About two miles in advance, I came to a large village called Kainsur, between which and the pass I had thrice to cross a large nullah and several smaller water-courses, over all of which it would be necessary to have bridges. After resting a little, I continued my journey, and passing several large villages, including old Deogurh, reached the modern town of that name, distant $13\frac{1}{2}$ miles from last ground. I found a large red and white tent ready pitched for me by the Raja's orders, and an abundance of supplies had been collected; this civility was quite unexpected, but there was probably a reason for it.

Deogurh is a large straggling village, distant one mile from the hills on the northern side of the valley, which may here be about two and a half miles wide. The Raja's *Noor*, or palace, together with some small temples are the only pucca buildings; there are small water-

courses or aqueducts passing through every street and garden, the water being conducted from the famous cataracts which is in the hill just above the town; the fields for several miles are irrigated from these falls. I was too much fatigued on my arrival to look about me, added to which it was late in the day.

Although the apparent comfort of a tolerable good tent was thus provided, I had more reason for anger than pleasure, for I had sent on part of my guard and the Political Agent's Muktar (an Ooriya)—who had been so officious in attempting to prevent my coming by this route—to have a bower prepared in some shady spot, distant at least two miles from hence, and had given most positive orders on this head; for in the first place, I wished to avoid an interview with the Raja, travelling in the uncomfortable manner I was forced to do; secondly, I wished to put it out of the power of my followers to extort money, "*Salamí*," from him, a regular practice with native servants of political establishments, particularly with the worthies of Cuttack, two of whom accompanied me* on the present occasion. This kind of systematic plunder is perhaps one of the chief causes of aversion the inhabitants have to our making a thoroughfare in their different states.

I suffered more from the heat this, than on any of the previous days of my journey, but towards 3 p. m. a severe north-wester came on, followed by a heavy shower of rain, which cooled the atmosphere for the time being, but the steam from the wetted ground rendered the heat at night nearly suffocating.

The Raja paid me a visit at 5 p. m. he is a fine handsome lad, of about eighteen years of age, but rather effeminate; he does not appear to be very wise. He expressed great anxiety about the new road, and begged I would not bring it through Deogurh, as there were (of course) other much better paths, but that if I did do so, that Lehragurh and

* When I went on my tour to the Coal Mines of Talcher last year, I was informed, on credible authority, that a Chuprassie of the Commissioner's establishment who accompanied me, had declared that the trip was worth fifty Rupees to him, and that he wagered that he would not make less before he returned to Cuttack. This man subsequently gave me much trouble by his unceasing attempts to lead me by a round-about route through Dhenkernalgurh, Hindolegurh, Ungoolgurh, that he might secure the usual nuzzers which the Raja's offer on paying their first visit; and when he found that I was not to be led, he prevailed upon me to allow him to go to Dhenkernal with the Commissioner's Purwanah, assuring me that unless he did so I should get no supplies or aid; he again attempted the same trick in Ungool, but I prevented him, and suffered no small inconvenience in consequence; yet this man was the most active and best informed person on the establishment.

Keunjurgurh must have the road through them likewise, for it to be at all a straight line; there was more in this sapient remark than meets the eye; part of the meaning is this,—that if he were to have the nuisance imposed on him, he thought that the Lehra and Keunjur Rajas should share it likewise. I was subsequently informed that he had paid a good deal of money to some of Mr. Babington's people and to my own, to ensure their good services in dissuading me from adopting this line.

The Raja when about to leave, let me know through the medium of his "*Spreach sprucher*" that he had a very urgent request to make. I requested him to speak out, when he told me a long story about some Mussulman Saudagurs from Cuttack who were sitting *Dhurna** at his gate, wishing to insist on his paying them some debts of old standing, with compound interest thereon, and that he wished me to interfere in his behalf, as he was about to proceed himself Cuttack to wed a daughter of the old ex-Rani of Sumbulpur; having no power to interfere I declined doing so, further than recommending the merchants to have patience; I accordingly directed their attendance in the evening, took leave of the Raja, and proceeded immediately to see the falls, where I was told that there were many "*Assura ka hār*" or giant's bones, a denomination generally applied to fossils; so that I proceeded with all haste, expecting a fine harvest. It was becoming dark just as I reached the lowermost basin of the falls, in a beautiful woody recess, the rocks towering several hundred feet above. I never saw a more enchanting spot, the mango and other trees growing to an incredible height. There are five falls and as many basins formed by them; the height of each may be about seventy or eighty feet; the volume of water is considerable. I climbed to the second basin, and there waited till torches were procured to enable me to see the "giant's bones," but, lo! what was my disappointment when I found that these said bones were nothing more than large masses of stalactite in which were fantastic caves. The inhabitants make lime with it, as an ingredient for their paun and betel nut, and their method of burning it is rather singular; some hold a slab of stone with a heap of lighted charcoal against the roofs of the caves; the parts affected by the heat drop off into the fire, which is then extinguished, and the particles of lime separated from the coal. Another

* Sitting *Dhurna* is a common practice with natives who wish to attain any particular object; the custom is, to sit at the door or gate of a person without taking food or drink until the party entreated yields, and should the petitioner die, the curse of his blood is supposed to rest on the latter.

method is this, a few small pieces of the rock are put into a wisp of damp rice straw along with some lighted charcoal, the wisp is then wound up into a ball as tight as possible and tied to a string, by which it is kept swung smartly round until the lime is ready, this the burners know by the state in which the wisp appears. This practice I have observed elsewhere in use in burning the limestone nodules (Kunkur) for the same purpose. But to return to the falls—I could not see much by torch-light though I had several, the glare of which added to the magical appearance of this truly romantic spot; a cold breeze blows down from the upper falls, which the guides assured me never ceased all the year round. There are several fabulous stories connected with the spot, and a large serpent is said to inhabit one of the caverns, which is not however improbable.*

I felt very much inclined to halt and pass a day here, but the rains having commenced, it would have been dangerous to prolong my stay in jungles, I therefore returned to camp where I found the merchants in attendance together with the Raja's people; the former seemed little inclined to listen to any terms short of payment in full of their exorbitant demands; the latter urged the inability of their master to pay more than 250 Rupees out of 3,000 with an I. O. U. for the balance when he should return from Cuttack with his bride, and, what to him was perhaps more valuable, her dowry. *

I should here observe that there are many Mussulman and other merchants who come from Benares and Cuttack with indifferent horses and inferior merchandize of kinds, which they pawn upon the ignorant grandees of these outlandish places; they give long credit on promise of interest, and consider themselves lucky if some few years afterwards they realize the amount of purchase money, which from its exorbitant nature, renders ample remuneration for the trouble and delay they are subjected to, sometimes having to wait for several months together, being put off with repeated promises of payment, and as many plausible excuses for non-payment, till at last an order is given them upon the farmers of one or more villages who may be in arrears to their lord; from these the merchants screw as much as they can, the amount of which, of course, very much depends on their power and temper, and

* Mr. Motte in his Narrative describes an enormous serpent called *Nagbunse*, which is worshipped some where near Sumbulpur, see p. 82, Asiatic Annual Register, Vol. 1. I have been told that this reptile is still in existence, and that the diamond washers make offerings, if they neglect which, they suppose their search will be fruitless.